Small Business Innovation Research/Small Business Tech Transfer

Bulk GaN Schottky Diodes for Millimeter Wave Frequency Multipliers, Phase II

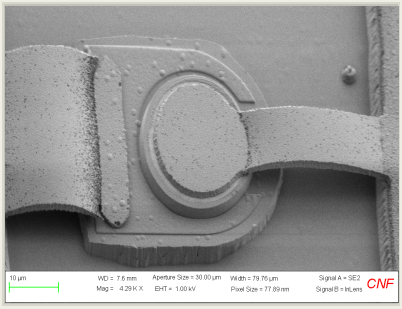
Completed Technology Project (2017 - 2019)

Project Introduction

Within the context of this project, White Light Power Inc. (WLPI) will demonstrate prototype vertical GaN Schottky diodes for high-power rectification at W-band. To achieve this goal, WLPI will utilize it's experience of fabricating power rectifier diodes to enable highly cost-efficient selection of a wafer. The same experience will also be utilized in selecting and working with an epi-supplier to ensure demonstration of the requisite 1000 cm2/Vs mobility. WLPI will design, manufacture and test the diodes to ensure that the device characteristics such as breakdown voltage, C-V characteristics, leakage and ideality factor are consistent with the target 200 mW power handling capacity. WLPI will provide data and documentation supporting and detailing the wafer selection, epi qualification, manufacturing and testing of the devices. WLPI will dice and deliver devices to NASA for further testing.

Anticipated Benefits

Terahertz radiometry-spectrometry is an important technique for remote sensing of terrestrial, planatery, and interstellar trace constituents and physical properties. Numerous NASA missions with sub-millimeter wave instruments have been deployed with a wide-range of mission targets. Further expansion of the capabilities requires increased local oscillator power. A first GaN stage that can provide increased power-handling capability will extend the sub-millimeter wave power that can be supplied for radiometry-spectrometry instruments. Potential NASA commercial applications will likely center around terrestrial sensing for various industries.One of the most important non-NASA applications of the multiplier diodes is in the terahertz imaging radars for home-land security applications. The high power GaN diodes that we are proposing to develop with this project will enable higher transmitter power and, thus, higher stand-off distance and higher sensitivity. Potential Non-NASA applications will center around remote-sensing and imaging for security or industrial control applications.



Bulk GaN Schottky Diodes for Millimeter Wave Frequency Multipliers, Phase II Briefing Chart Image

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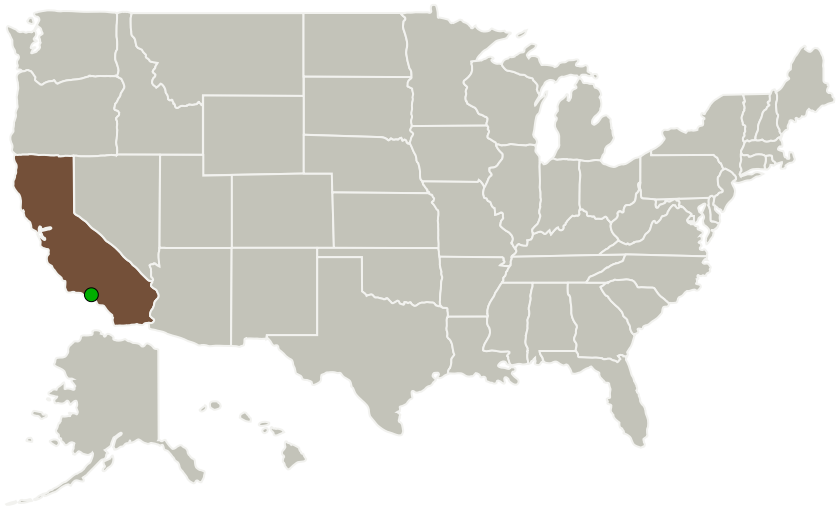
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
White Light Power, Inc.	Lead Organization	Industry	Los Altos, California
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

White Light Power, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Project Managers:

Robert A Jones
Carol R Lewis

Principal Investigator:

Christopher Martin

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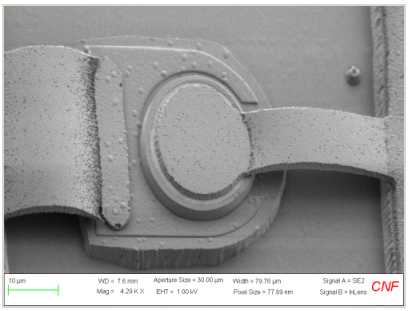
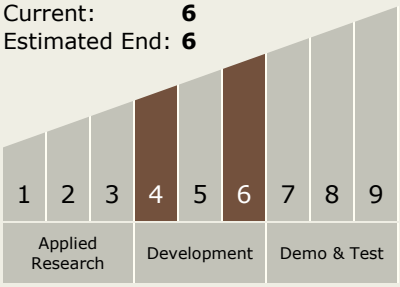
Images



Briefing Chart Image
Bulk GaN Schottky Diodes for Millimeter Wave Frequency Multipliers, Phase II Briefing Chart Image
(https://techport.nasa.gov/image/130490)

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System